A NEW SPECIES OF THE GENUS ISOMETRUS EHRENBERG 1828 FROM CHINA (SCORPIONES, BUTHIDAE)

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Abstract A new species, Isometrus (Raldyanus) tibetanus sp. nov. from Tibet, China is described. For comparative purposes, Isometrus (Raldyanus) assamensis Oates, 1888, originally described from India, and also distributed in Nepal, is redescribed based on the original type materials (holotypes) and a series of specimens deposited in the Muséum National d'Histoire Naturelle, Paris. Key words Scarpion, Buthidae, Isometrus, new species, Tibet.

1 Introduction

The genus *Isometrus* was erected by Ehrenberg (in Hemprich & Ehrenberg, 1828) with Buthus (Isometrus) film Ehrenberg, 1828 [= Isometrus maculatus (DeGeer, 1778)] as monotypic species. Vachon (1972) proposed the division of the genus Isometrus into two subgenera: Isometrus Ehrenberg and Reddyanus Vachon. diagnosis for the two subgenera were indicated only in a short key and based on the relative position of certain trichobothria. In subgenus Isometrus, trichobothrium db of the fixed finger in a distal position in relation to the trichobothria et and est; the distance between external trichobothria of the femur e_1 and e_2 being more than two to five times of the distance between trichobothria e_1 and d_3 . In contrast, in subgenus *Reddyanus*, trichobothrium db in a basal position to et, situated between et and est; the distance between external trichobothria of the femur, e1 and e2 always less than two times of the distance between e_1 and d_3 .

Vachon (1972) placed three species in the subgenus *Isometrus* and five in the subgenus *Reddyanus*, whereas five others remained unclear classification. In the catalog of the scorpions of the world, Fet & Lowe (2000) placed six species in the subgenus *Isometrus* and all the others (16) in the subgenus *Reddyanus*. In the revision of the genus, Kovařík (2003) placed four species in the subgenus *Isometrus* and all the others (21) in the subgenus *Reddyanus*.

In the revision of the genus *Isometrus*, Kovařík (2003) described four new species, whereas the already known species were limited to citations, followed by lists of the studied material. This was the case for *Isometrus* (*Reddyanus*) assamensis Oates, 1888. For this species, Kovařík (2003) examined the original types and designated one male lectotype and five paralectotypes.

Our own examination of the original type material of I. (R.) assamensis, deposited in the Natural History Museum, London, revealed that at least some of the specimens in this series were poorly preserved and most certainly preadults. Moreover, the study of several specimens from Nepal, deposited in the Muséum National d Histoire Naturelle, Paris, clearly suggested that sexual dimorphism is poorly pronounced in juveniles or pre-adults of this species. Since I. (R.) assamensis remains poorly characterized, we decided to redescribe this species in the present paper. A new species, Isometrus (R.) tibetanus sp. nov., related to I. (R.) assamensis was also described from Tibet, China. With the new discovery, the number of Isometrus species present in China is raised to three: Isometrus (Isometrus) maculatus (DeGeer, 1778), Isometrus (Reddyamus) hainanensis Lourerço, Qi & Zhu, 2005 and Isometrus (Raddyanus) tibetanus sp. nov.

2 Methods and Material

Illustrations and measurements were produce using a Wild M5 stereo microscope with a drawing tube and an ocular micrometer. Measurements follow Stahnke (1970) and are given in micrometer (mm). Trichobothrial notations follow Vachon (1974) and morphological terminology mostly follows Vachon (1952) and Hjelle (1990).

Sub-cuticular pigmentation may be very stable within buthid species populations (Lourerço, 1983; Lourerço & Cloudsley Thompson, 1996), and therefore useful as a taxonomic character in the definition of species. The material used for the redescription of $I.\ (R.)$ assamensis was found in the collections of the Muséum National d Historie Naturelle, Paris. It is quite well preserved. The new species is based on one specimen entrusted to the senior author some years ago. It is now deposited in

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MHBU. All the described specimens in the present paper are adult and deposited in alcohol (Depositores: BMNH = The Natural History Museum, London; MNHN = Muséum National d'Histoire Naturelle, Paris; MHBU= Museum, Hebei University, Baoding, China).

3 Taxonomic Treatment

Buthidae C. L. Koch, 1837

Isometrus Ehrenberg, 1828

Isometrus (Reddyanus) assamensis Oates, 1888 (Figs 1-13, 27-31, 33)

Isometrus assamensis Oates, 1888: 250; Kraepelin, 1896: 126; Kraepelin, 1899: 67; Pocock, 1900: 48; Kraepelin, 1913: 135; Takashima, 1945: 86

Isometrus (Reddyanus) assamensis: Vachon, 1972: 177; Tikader & Bastawade, 1983: 292; Fet & Lowe, 2000: 151; Kovařík, 2003: 5.

Material. India, Assam, Dhubri, 1 male, 5 females, type series BMNI+ 1889. 7. 31. 76-77, E. W. Oates (C et P). Material poorly preserved (1 male lectotype and paralectotypes designated by Kovařik (2003)). Nepal, Butwal-Tansen, 350-400 m, 1 Jan.

1967 (M. Hubert), 2 male juveniles (MNHN-RS-7707); Dhara Pani, 10 Apr. 1970 (M. Hubert), 1 (MNHN+RS-5412);male iuvenile. 1 female Narayengath, 150 250 m, 19 Dec. 1966 (M. Hubert), 1 male, 2 females (MNHN-RS-7705), 1 male, 1 female (MHBU); 21 Dec. 1966 (M. Hubert), 1 male (MNHN RS-7702); 22 Dec. 1966 (M. Hubert), 1 male (MNHN RS-7703), 1 male (MNHN RS-7704); 25 Dec. 1966 (M. Hubert), 2 males, 3 females (MNHN-RS-8224); Palture (W-km 72), 1 450 m, 28 May 1973 (M. Hubert), 2 males (MNHN-RS-6618); Pathiva, 28 Dec. 1966 (M. Hubert), 1 male juvenile, 1 female (MNHN RS 7706); Sangara, 170 m, 30 Dec. 1966 (M. Hubert), 1 male juvenile (MNHN RS 7700); Satinagarh, 250 m, 31 Dec. 1966 (M. Hubert), 1 male (MNHN RS-7701).

Diagnosis. Scorpion of moderate to small size, with respect to the genus, females ranging from 28 to 32 mm and males from 36 to 40 mm in total length. General coloration yellow to reddish yellow with intense brownish variegated pigmentation over the body and appendix.

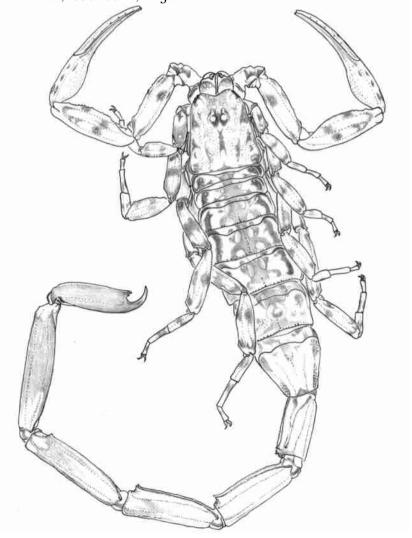
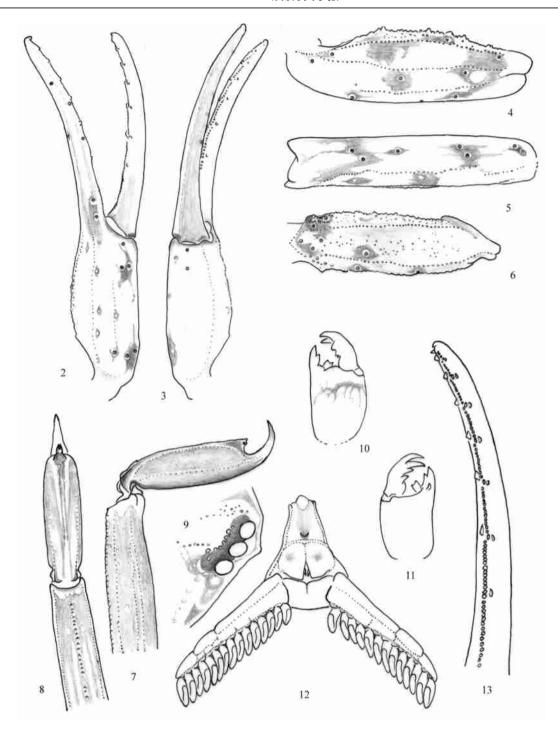


Fig. 1. Habitus of Isometrus (Reddyanus) assamensis. Male from Nepal.



Figs. 2 13. Isonetrus (Reddyanus) assemensis. Male from Nepal. 2-6. Trichobothrial pattern. 2-3. Chela dorso external and ventral aspects. 4-5. Patella, dorsal and external aspects. 6. Femur, dorsal aspect. 7-8. Metasomal segment V and telson, lateral and ventral aspects. 9. Lateral eyes, dorsal aspect. 10-11. Chelicera, dorsal and ventral aspects. 12. Sternum, genital operculum and pectines. 13. Dentate margin of movable finger, showing rows of granules.

Carinae and granulations moderate to weak. Pectines small; pectinal tooth count 13 to 16 for males and 13 to 15 for females. Dentate margins of fixed and movable fingers of pedipalp chela with 7 nearly almost linear rows of granules. Subaculear tubercle strong and rhomboid in male, between rhomboid and spinoid in female.

Coloration. Generally yellow to reddish yellow with intense brownish variegated pigmentation over the body

and appendix. Prosoma: carapace reddish yellow with several brownish spots or pigmented zones all over its surface; eyes surrounded by black pigment. Mesosoma: tergites yellowish with 3 longitudinal brownish stripes, and dark confluent zones on the posterior edge of tergites I - VI. Metasoma: segments I to III yellowish, segment IV reddish yellow, segment V dark reddish; presence of dark spots on the ventral surface and carinae,

well marked on segments IV-V. Vesicle dark reddish; aculeus reddish, slightly paler than vesicle. Venter yellowish. Chelicerae yellowish with pale brownish variegated spots on its anterior half; teeth reddish. Pedipalps: yellowish with brownish variegated spots over all faces, excepted ventrally; chela fingers much darker than chela hands; rows of granules on dentate margins of the fingers dark reddish. Legs yellowish with variegated brownish spots.

Morphology. Prosoma. Anterior margin of carapace moderately to strongly emarginate. Carapace carinae almost obsolete, with only the anterior median carinae weakly developed. Intercarinal spaces with a thin moderately intense granulation. Median ocular tubercle anterior to the centre of the carapace; median eyes separated by approximately one ocular diameter. Three pairs of lateral eyes. Mesosoma: tergites I - VI with a

median carina; obsolete on I, weak to moderate on II-VI. Tergite VII pentacarinate, with lateral pairs of carinae moderate to strong; median carinae present in proximal half, moderately developed. Intercarinal spaces with a thin granulation. Stemites smooth, with moderately long spiracles; sternite VII with four cariane, well marked in female. Pectines moderately long, pectinal teeth count 13 to 16 in males, 13 to 15 in females. Metasoma: segment I with 10 carinae, crenulate; II- IV with 8 carinae, crenulate. Segment V with five carinae; one posterior spinoid granule on the dorsal carinae of segments I - IV. Dorsal furrows of all segments obsolete, with minute intercarinal spaces with thin intense granulations; granulations. Telson almost smooth with one ventral carina; subaculear tubercle strong and rhomboid in males, more to spinoid in females with two granules on the ventral surface. Chelicerae with the dentition

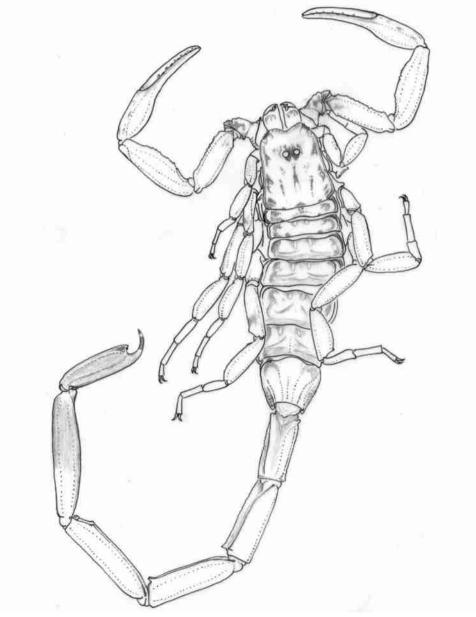


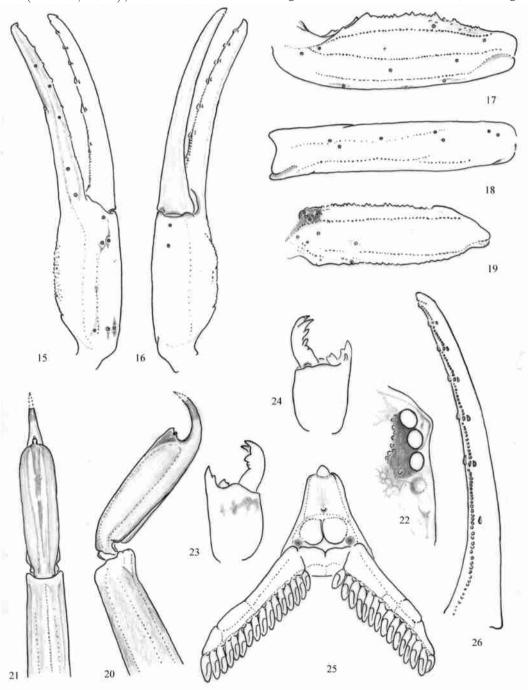
Fig. 14. Habitus of Isometrus (Reddyanus) tibetanus sp. nov., male holotype.

characteristic of the buthids (Vachon, 1963); two small basal teeth on movable finger. Pedipalps: femur pentacarinate; all carinae moderately crenulate. Patella with 7 carinae, moderately crenulate; dorsointernal carinae with 4-5 spinoid granules. Chela with vestigial carinae. Intercarinal spaces weakly granular. Dentate margins on movable and fixed fingers composed of seven linear rows of granules. Trichobothrial pattern type A, orthobothriotaxic (Vachon, 1974); dorsal trichobothria

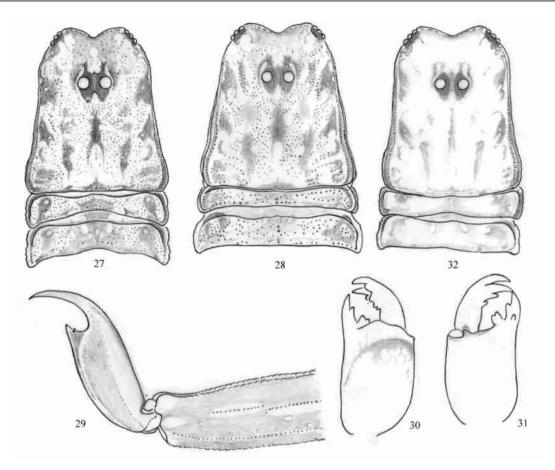
of femur in β (beta) configuration (Vachon, 1975). Legs: ventral aspect of tarsi with a brush-like group of setae. Tibial spurs absent; pedal spurs present and moderately developed on legs III IV.

Isometrus (Reddyanus) tibetanus **sp. nov.** (Figs. 14 26, 32, 33)

Type material. 1 male holotype. China, Tibet, Region of Chesu, Oct. 1970 (Lindberg leg). Now



Figs 15-26. Isometrus (Reddyanus) tibetanus sp. nov. Male holotype. 15-19. Trichobothrial pattern. 15-16. Chela dorso external and ventral aspects. 17-18. Patella, dorsal and external aspects. 19. Femur, dorsal aspect. 20-21. Metasomal segment V and telson, lateral and ventral aspects. 22. Lateral eyes, dorsal aspect. 23-24. Chelicera, dorsal and ventral aspects. 25. Sternum, genital operculum and pectines. 26. Dentate margin of movable finger, showing rows of granules.



Figs. 27-31. Isometrus (Reddyanus) assamensis, male and female from Nepal. 32. Isometrus (Reddyanus) tibetonus sp. nov., male holotype. 27, 28, 32. Carapace and tergites I - II, dorsal aspect, showing characteristic patterns of pigmentation. 29. Metasomal segment V and telson, lateral aspects. 30, 31. Chelicera, dorsal and ventral aspects.

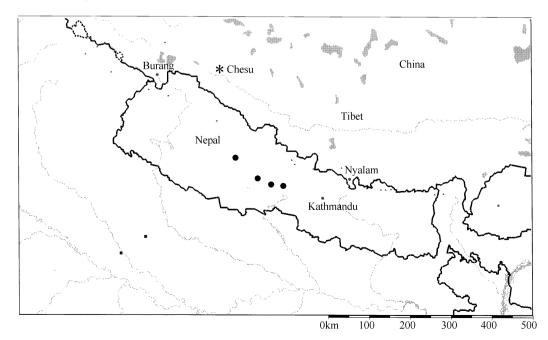


Fig. 33. Map of China, Tibet and Nepal, showing the type locality of the new species (black star) and the localities of collection of I. (R.) assumensis (black dots).

deposited in MHBU.

Etymology. The specific name makes reference to

Tibet, type locality of the new species.

Diagnosis. Scorpions of small to moderate to small

size, with respect to the genus, measuring from 38 mm (male). General coloration pale yellow to slightly reddish yellow throughout body and appendages. Carinae and granulations weak. Pectines small; pectinal tooth count 16-16 for the male. Dentate margins of fixed and movable fingers of pedipalp chela with 7 almost linear rows of granules. Telson elongated in male; subaculear tubercle strong and rhomboid, with two ventral granules. From its general morphology, Isometrus (Reddyanus) tibetanus sp. nov. appears to be most closely related to Isometrus (Reddyanus) assamensis Oates, 1888, originally described from Dhubri in India, and also distributed in Nepal It can be distinguished from the latter by the following characters: 1) a much paler coloration, pale yellow to slightly reddish yellow, with unconspicuous spots. In contrast I. (R.) assamensis is yellowish but with brown spots over the body and appendix, and a dominant blackish coloration over the carapace and tergites; 2) metasomal segments carinae and posterior spinoid granules on dorsal carinae are weaker in the new species; 3) granulations on carapace and tergites are thinner or obsolete on the new species.

Coloration. Generally pale yellow to reddishryellow. Prosoma: carapace yellowish with some vestigial spots or pigmented zones on the lateral and posterior margins; eyes surrounded by black pigment. Mesosoma: tergites yellowish with vestigial spots on I. Metasoma: segments I to IV yellowish; segment V reddishryellow. Vesicle reddishryellow; aculeus reddishryellow at the base and reddish at its extremity. Venter pale yellow. Chelicerae yellowish with vestigial pale brownish variegated spots just behind fingers; teeth reddish. Pedipalps: yellowish throughout, excepted for some vestigial pale brownish spots on femur; rows of granules on dentate margins of the fingers pale reddish. Legs pale yellow with only obsolete spots.

Morphology. Prosoma: anterior margin of carapace emarginate. Carapace carinae obsolete, with only the anterior median carinae weakly developed. Intercarinal spaces with a thin or obsolete granulation. Median ocular tubercle anterior to the centre of the carapace; median eyes separated by one ocular diameter. Three pairs of lateral eyes. Mesosoma: tergites I - VI with a median carina, weak to moderate. Tergite VII pentacarinate, with lateral pairs of carinae moderate to median carinae present in proximal half, moderately developed. Intercarinal spaces with a thin or obsolete granulation. Sternites smooth, with rather short sternite VII with four carinae. Pectines moderately long; pectinal teeth count 16-16. Metasoma: Segment I with 10 carinae, moderately crenulate; II- IV with 8 carinae, moderately crenulate. Segment V with five carinae; one posterior spinoid granule on the dorsal carinae of segments I-IV. Dorsal furrows of all segments obsolete and smooth; intercarinal spaces weakly

granular. Telson smooth with one ventral carina; subaculear tubercle strong and rhomboid, with two granules on the ventral surface. Chelicerae with the dentition characteristic of the buthids (Vachon, 1963); two small basal teeth on movable finger. Pedipalps: femur pentacarinate; all carinae moderately crenulate. Patella with seven carinae, moderately crenulate; dorsointernal carinae with 56 spinoid granules. Chela with vestigial to obsolete carinae weakly crenulate. Intercarinal spaces weakly granular to almost smooth. Dentate margins on movable and fixed fingers composed of seven linear rows of granules. Trichobothrial pattern type A, orthobothriotaxic (Vachon, 1974); dorsal trichobothria of femur in (beta) configuration (Vachon, 1975). Legs: ventral aspect of tarsi with a brush-like group of setae. Tibial spurs absent; pedal spurs present and moderately developed on legs III IV.

Distribution. China (Tibet).

Table 1. Morphometric values (in mm) of male and female of Isometrus (Reddyanus) assamens is from Nepal and for the male holotype of Isometrus (Reddyanus) tibetanus sp. nov.

	(Reddyanus) tibetanus : Isometrus (R.) assamonsis		Isometrus (R.) tibetanus sp. nov.
	Male	Female	Male (holotype)
Total length	39. 8*	31. 9*	38 3*
Carapace:			
- Length	4. 1	3. 9	4. 0
- Anterior width	2. 3	2. 3	2. 4
- Posterior width	3. 7	3. 8	3. 6
Metasomal segment I:			
- Length	3. 3	2. 3	3. 2
- Width	1. 6	1. 7	1. 5
Metasomal segment V:			
- Length	6. 5	4. 7	6. 1
- Width	1. 3	1. 3	1. 2
- depth	1. 5	1. 4	1. 3
Vesicle:			
- Width	1. 2	0. 9	1. 0
- Depth	1. 3	1. 1	1. 2
Pedipalp:			
-Femur length	3. 8	3. 3	3. 7
- Femur width	1. 2	1. 2	1. 1
- Patella length	4. 5	3. 9	4. 3
- Patella width	1. 5	1. 3	1. 3
- Chela length	6. 5	5. 5	6. 1
- Chela width	1. 3	1. 0	1. 1
- Chela depth	1. 1	0. 9	1.0
Movable finger:			
- Length	4. 0	3. 7	3. 6

^{*} For the total length, we don't take in consideration the telson's length. If this value is added, the total length would be respectively 44 6 and 35.4 mm for *I*. (*R*.) assamen is and 42.7 for *I*. (*R*.) thetanus sp. nov.

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中国等蝎属一新种(蝎目,钳蝎科)

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摘要描述了采于中国西藏等蝎属1新种——西藏等蝎, Isandrus (Raddyunus) tibetanus sp. nov.。为了比较,根据原始模式标本和保存在法国自然博物馆的系列标本,重新描述了原始描述于印度和尚分布于尼泊尔的阿萨姆等蝎 Isandrus (Reddyanus) assamansis Oates, 1888。

西藏等蝎,新种 Isometrus (Reddyanus) tibetanus **sp. nov.** (图 1~13, 27~31, 33)

正模 き、中国西藏车苏 (Chesu)、1970年 9月、Lingberg 采 (现保存在河北大学博物馆)。

关键词 蝎, 钳蝎科, 等蝎属, 新种, 西藏. 中图分类号 Q959. 226. 4 体长 42.70 mm。根据一般形态,新种近似于原始描述产于印度和尚分布于尼泊尔的阿萨姆等蝎 Isometrus (Reddyamus) assamensis Oates, 1888 (图 14~26,32,33),但如下特征不同于后者: 1) 身体颜色更浅,呈浅黄色到浅红黄色,具不明显或荒废的斑点,而阿萨姆等蝎 I. (R.) assamensis 相反,其身体和附肢具褐色斑点,且背甲和中体背板主要为浅褐色,2)后体节的脊和背脊的后顶颗粒较弱,3) 背甲和中体背板的颗粒稀少或荒废。

词源: 新种的种名以模式标本的产地而拟定。